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⑫

## EUROPEAN PATENT APPLICATION

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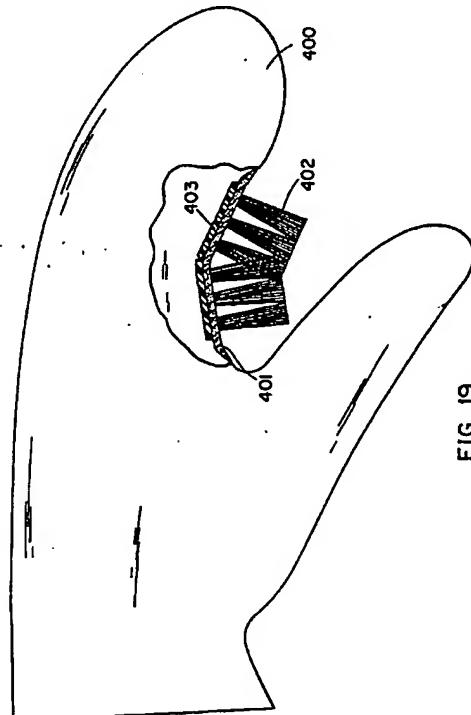
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### ㉓ Brush and fabric combination cleaning device.

㉔ The device consists of a fabric body (401) having upper and lower surfaces with tufts (402) disposed on the upper surface and a tuft supporting member (403) disposed against the lower surface. The tuft supporting member may have projections which project through the fabric body and are fused to the tufts. The tuft supporting member (403) may have a line of weakness in order to permit flexing.



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The invention relates to natural and synthetic tufted fabrics, which when employed for cleaning and drying allow the removal of debris and other foreign matter from most types of object.

Many types of tufted cleaning and cleaning related fabrics have been disclosed over the years, two such disclosures being U.S. Patents 3,799,616 and 4,912,800 issued to John C. Lewis, Jr. and Barry Zeltner respectively. These patents describe a towel or fabric having brush filament tufts extending outwardly from one surface only.

US-3,799,616 discloses one or more individual filament tufts fused directly onto a fabric or fabric-like surface without any support means except that of the filament base of the tuft being attached to the upper surface of said fabric. Without any direct connection between the individual tufts, the brush construction formed cannot be stabilized, and the working ends of the tufts do not converge in a uniform plane and are not held in said plane.

US-4,912,800 discloses a preformed fused brush whose base is then heat fused onto the upper surface of a towel. The resultant brush is merely "glued" to the towel's surface and is easily removed.

In U.S. Patent No. 4,849,271, there is described a door mat which uses a nonwoven fibrous layer with a backing material. A depression or hole in the fibrous layer is provided to receive a tuft of bristles. The specification describes that the backing material can be zonally melted and the end of the tuft of fibers may also be melted so that the two fuse when they cool. Similarly, in U.S. Patent No. 4,741,941, a nonwoven web of fibers is layered on top of a sheet having projections raised therefrom.

Neither patent describes a procedure for mounting tufts on a woven fabric alone.

According to a first aspect of the present invention, there is provided a brush and fabric combination cleaning device for use as a brushing device as well as a wiping and/or cleaning device, comprising: a fabric body having first and second surfaces; at least one tuft projecting away from the first surface of the fabric body; and a tuft supporting member located under and fixed to each tuft and abutting against the second surface of the fabric body.

The present invention provides a tufted brush construction radiating from the first surface of a natural or synthetic woven and/or nonwoven fabric body. Each tuft is fixed to the supporting member (base substrate) located against the second surface of the fabric body, whereby each tuft is locked onto the fabric body.

In this manner, the fabric body and brush construction are essentially one, and it is difficult to separate the brush construction from the fabric body. This property is essential when designing a tufted fabric which can be washed in a mechanical washing machine, and then subjected to a drier device, in or-

der to reuse the fabric over and over again, whilst retaining the structure of the cleaning fabric.

The improved device generally includes a tuft supporting member, with or without hinge-like grooves, a fabric body and synthetic filament tufts fixed to the tuft supporting member.

Embodiments of the invention have self-supporting brush tufts radiating from the upper surface of the fabric body while fused directly onto the tuft supporting member located against the under surface of the fabric body and may be employed for brushing and cleaning an object.

Embodiments provide a heavy duty cleaning towel having brush tufts whose working ends project away from the towel. In a specific brush design, the tufts may be used to clean and brush away debris from an object and then, immediately thereafter, the object may be wiped with the towel's surface.

Embodiments of the invention provide a flexible brush construction integral with a wiping towel, wherein the brush construction is flexible to produce a three-dimensional brush face from an originally planar brush face.

Embodiments of the invention may be constructed as a tufted mitten (glove) having a brush construction. The mitten (glove) may be manipulated so that the brush face conforms to the surface of the object being cleaned.

Non-limiting embodiments of the invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a brush fabric cleaning device illustrating a brush;

Figure 2 is a view of the underside of Figure 1;

Figure 3 is a top view of a base plate employed in embodiments of the invention;

Figure 4 is a cross-sectional view of Figure 3 as taken along lines 4-4;

Figure 5 is a cross-sectional view of Figure 3 as taken along lines 5-5;

Figure 6 is a top view of another base plate having a geometric shape in the form of a circle;

Figure 7 is a cross-sectional view of Figure 6 as taken along lines 7-7;

Figure 8 is a perspective view of a base plate having two projections;

Figure 8' is a side view of a base plate of Figure 8 and towel prior to forming a tufted towel;

Figure 9 is a partial top view of the base plate of Figure 8 wherein the towel section has been overlaid;

Figure 10 is a cross-sectional view of Figure 9 as taken along lines 10-10;

Figure 11 is the cross-sectional view of the tufted towel of Figure 10;

Figure 12 is a cross-sectional view of the base portion of Figure 11 after having been melted;

Figure 13 is a cross-sectional view of the melted

plate of Figure 12 illustrating fusing of tufts; Figure 14 is a cross-sectional view of Figure 13 illustrating the tufts as fused; Figure 15 is a perspective view of the construction of Figure 14; Figure 16 is an edge view of a tufted construction illustrating converging tufts; Figure 17 is an edge view of a tufted construction illustrating a planar tuft design; Figure 18 is an edge view of a tufted mitten construction; and Figure 19 is a cross-sectional view of a tufted mitten construction.

Each brush fabric cleaning device illustrated in the Figures includes a fabric body that is primarily designed to clean, dry or polish articles and a group of brush filament tufts which are integral with a brush tuft-supporting body member. The body member extends along the underside of the fabric body while the tufts project away from the fabric body's upper surface, e.g. at about 90 degrees to the upper surface.

Figure 1 illustrates one such device 10 with fabric 11 having a pre-assembled group of filament tufts 12 fused at their base portions 13 and having their working ends 14 radiating at approximately 90 degrees from the surface of fabric 11. While it appears that the tufts 12 are fastened to the fabric's surface 11' at position 13, in reality the tufts 12 are fused onto a tuft supporting member 15 on the underside of fabric 11 at or near position 11" as shown in Figure 2.

A preferred embodiment of the invention can best be illustrated by the following drawings. A base or filament supporting member 100 of Figure 3 shows the base member 100 prior to processing where there is base 100 having projections 101 molded integrally with base 100 at positions 101' and extending in a tapering attitude upward and away from the base 100 and terminating in a tip (point) 102 at a height of approximately 3/8 inch. It should be noted that the "height" is not critical, but can range from 1/8 up to 1 inch, while the base width (diameter) 101' can range from 1/8 up to 1 inch, depending upon the type and size of monofilament tufts to be fused thereon. Also there is illustrated a groove 103 or "hinge-like" section molded into the base member 100 which allows portions of the base member 100 to flex along said groove 103 thus giving the base 100 an ability to have some portion of its surface's plane (attitude) changed from a flat single plane to an angled attitude. It is not a requirement that the base or filament tuft supporting member 100 have groove(s) 103. However, depending upon the desired physical properties of the tufted fabric device, grooves and/or thin sections will allow controlled flexibility of the working brush portion.

Figure 4 is a cross-sectional view of Figure 3 taken along lines 4-4 and Figure 5 is taken along lines 5-5. The groove 103 of Figure 3 is best illustrated in Figure 5 where the two open sections of groove 103 are shown at positions 103' and 103" respectively.

Another base portion embodiment illustrating the instant invention is shown in Figure 6 and 7 wherein base member 200 has a more or less circular defined shape with molded integral projections 201 radiating from said base 200 at 201' and terminating at points 202. The cross-sectional view of Figure 7 illustrates the base portion 200 of Figure 6 as taken along lines 7-7. Figures 8-15 illustrate the method of manufacture and resultant brush fabric cleaner device. Figure 8 illustrates a molded brush base 300 prior to the method.

In Figure 8', the base member 300 is located under a fabric material 303, e.g. cotton towel, and the base 300 is moved in the direction E in order to allow projections (points) 302 to pierce said fabric 303 at positions 303'. The resultant construction is illustrated in Figures 9 and 10 wherein the points 302 have protruded through the fabric 303 at positions 304 and the molded base 300 lies parallel to under the fabric 303. Figure 10 illustrates the molded projection 301 in an attitude ready for fusing, as taken along lines 10-10 of Figure 9.

Figure 11 shows a heat melting device 305 located over the fabric/base portion 303/300 having heat melting probes 306, and in an attitude ready for indexing downward in direction F. As the heat melting device 305 is indexed in direction F, the melter probe 306, 306' engage the tips 302 of mold base 300 and melt down the tips 302 and main bodies 301 to form "pools" 301' of melted plastic as illustrated in Figure 12.

Simultaneously, filament picking devices 307 containing filaments 308, e.g. polypropylene monofilament, and having pre-melted filament mass 308', are indexed toward and onto the premelted base portion 300 in direction G in order to fuse the filament melted mass 308' to melted probe base 301', thus creating a fused brush fabric device as shown in Figure 14. The brush fabric device of Figures 14 and 15 has brush filament tufts 308 integral with the base 300 and fused thereto at positions 309'. The fabric portion 303 is held fast between the melted tuft mass 309 and base portion 300, thus creating a brush/towel combination whereby the brush portion is located on the "top" side of the fabric (towel) and the brush base portion is located on the "bottom" side of said fabric as shown in Figure 15.

Figures 16, 17 and 18 illustrate brush/fabric combinations whereby the base portion, upon being flexed, creates various flat, concave and convex brushing surfaces.

Figure 19 illustrates a brush/mitten (fabric) combination whereby the mitten 400 contains filament tufts 402 radiating from tuft receiving member 403 with fabric 401 located between said tufts and receiving member.

The present invention is not limited to the above embodiments, and many different brush constructions may be obtained by employing the present method. Brush/fabric combinations may be cleaning devices for cleaning athletic, medical or food processing equipment; personal brush/towel cleaning devices for cleaning personal or work clothes; and many other devices.

Many types of thermoplastic filaments may be used, such as, for example, polyethylene, polypropylene, polyester, polyamide and the like, while filament diameter, cross-sectional shapes, lengths, and the like may vary with the desired end result for the brush fabric cleaning device.

Various types of fabric material may be employed for the cleaning device. Both woven and nonwoven fabric materials taken from natural fibers as well as synthetic fibers can be employed.

### Claims

1. A brush and fabric combination cleaning device for use as a brushing device as well as a wiping and/or cleaning device, comprising:  
a fabric body (11, 303, 401) having first and second surfaces;  
at least one tuft (12, 308, 402) projecting away from the first surface of the fabric body; and  
a tuft supporting member (15, 100, 200, 300, 403) located under and fixed to each tuft and abutting against the second surface of the fabric body.
2. A brush and fabric combination cleaning device comprising:  
a fabric body (303, 401) having first and second surfaces;  
at least two tufts (308, 402) projecting away from the first surface of the fabric body; and  
a tuft supporting member (100, 403) having at least one line of weakness (103) which separates the tuft supporting member into two tuft supporting sections which abut against the second surface of the fabric body and are located under the tufts;  
at least one of the tufts being located above and fixed to one of the two tuft supporting sections;  
at least one of the tufts being located above and fixed to the other one of the tuft supporting sections; and  
the arrangement being such that, when the tuft supporting member (100, 403) is flexed, the tufts (308, 402) are spread apart or moved closer together so as to vary the brushing characteristics of the tufts.
3. A brush and fabric combination cleaning device according to claim 2, wherein each line of weakness is a groove (103).
4. A brush and fabric combination cleaning device according to any one of claims 1 to 3, wherein each tuft (12, 308, 402) is made of synthetic monofilaments.
5. A brush and fabric combination cleaning device according to any one of claims 1 to 4, wherein each tuft (12, 308, 402) is substantially normal to the first surface of the fabric body (11, 303, 401).
6. A brush and fabric combination cleaning device according to any one of claims 1 to 5, wherein each tuft (12, 308, 402) is integral with the tuft supporting member (15, 100, 200, 300, 403).
7. A brush and fabric combination cleaning device according to any one of claims 1 to 6, wherein:  
the fabric body (11, 303, 401) is made of cotton;  
each tuft (12, 308, 402) is made of polypropylene; and  
the tuft supporting member (15, 100, 200, 300, 403) is made of molded polypropylene.
8. A brush and fabric combination cleaning device according to any one of claims 1 to 7, wherein the fabric body (401) is hollow and its first surface is an outer surface and its second surface is an inner surface.
9. A brush and fabric combination cleaning device according to claim 8, wherein the fabric body (401) has the shape of a cleaning mitten or glove (400).
10. A method of manufacturing a brush and fabric combination cleaning device, comprising the steps of:  
providing a fabric body (11, 303, 401) having first and second surfaces;  
providing a plurality of tufts (12, 308, 402);  
providing a tuft supporting member (15, 100, 200, 300, 403) having projections (101, 201, 301);  
bringing together the tuft supporting member and the fabric body so that the projections of the tuft supporting member are pushed through from the second surface of the fabric body and project away from the first surface of the fabric body; and  
joining the projections to the bases (13, 308') of the tufts so that the tufts project away from the first surface of the fabric body.

11. A method of manufacturing a brush and fabric combination cleaning device according to claim 10, wherein the projections (101, 201, 301) are fused to the bases (13, 308') of the tufts (12, 308, 402).  
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FIG. 1

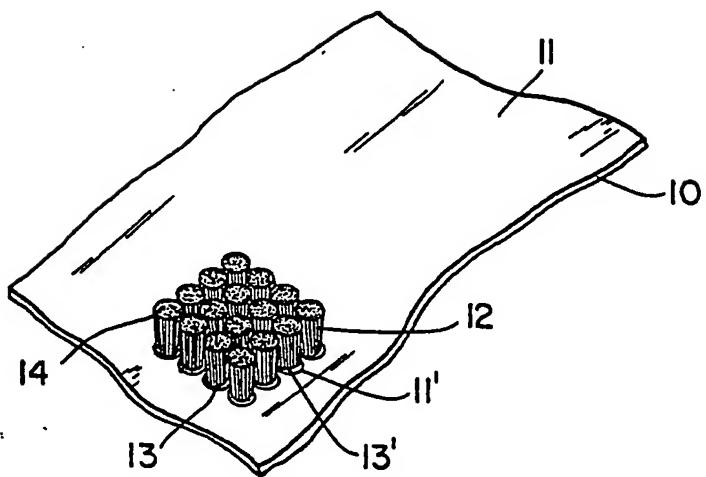
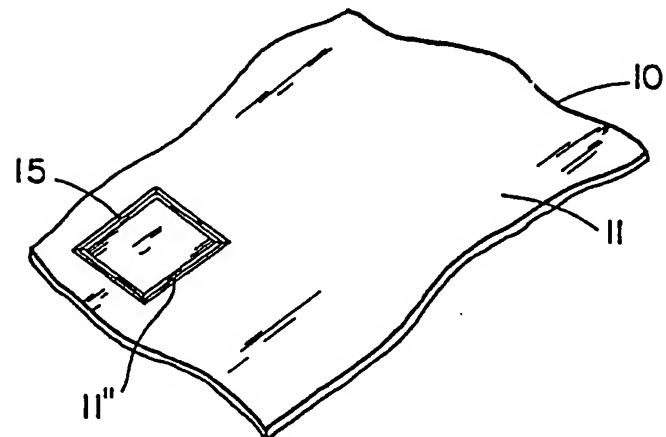


FIG. 2



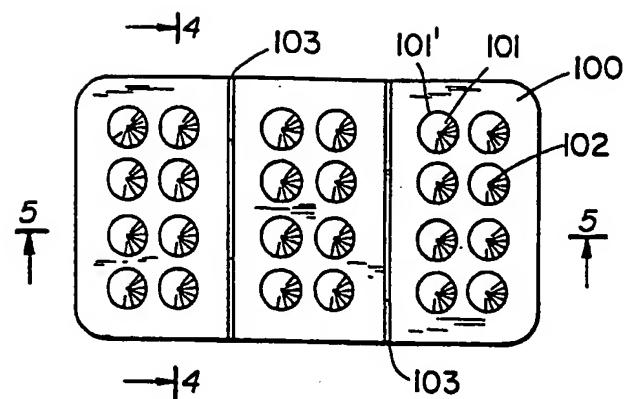


FIG. 3

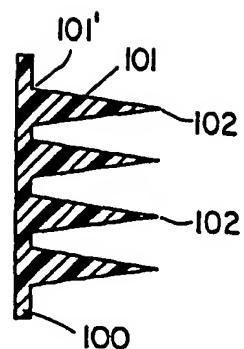


FIG. 4

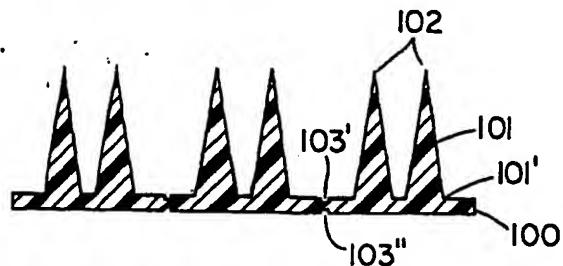


FIG. 5

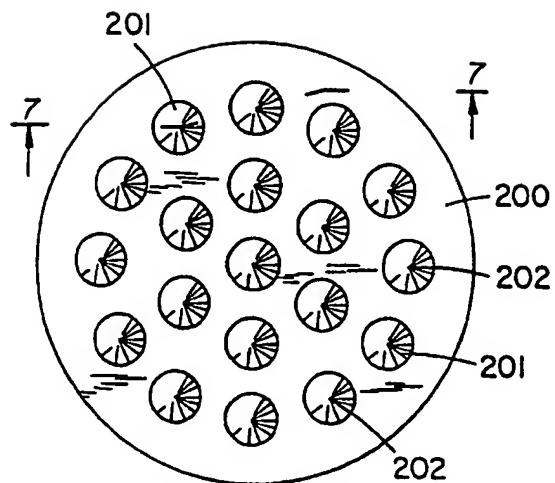


FIG. 6

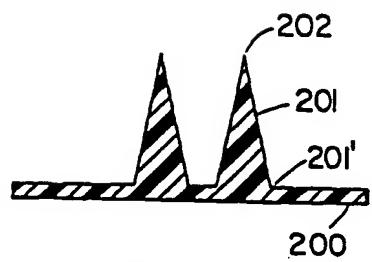


FIG. 7

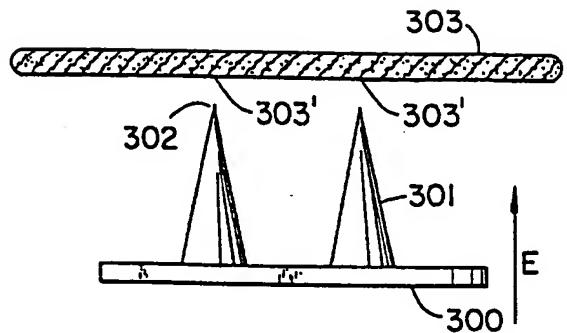


FIG. 8'

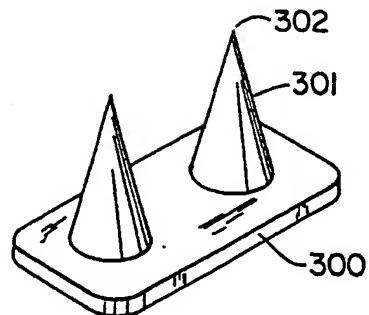


FIG. 8

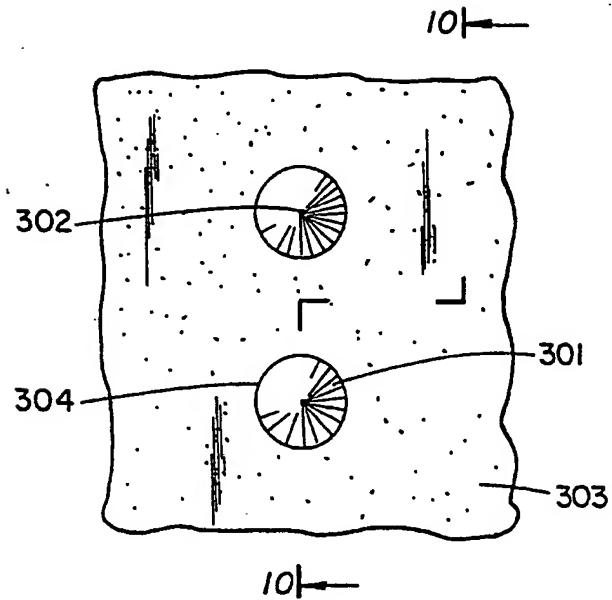


FIG. 9

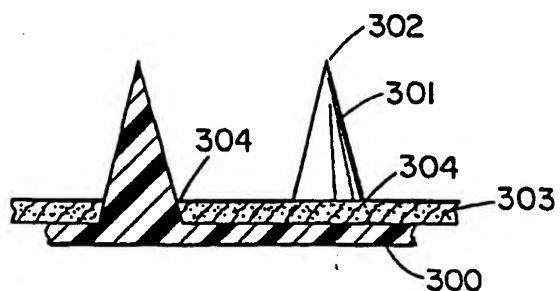


FIG. 10

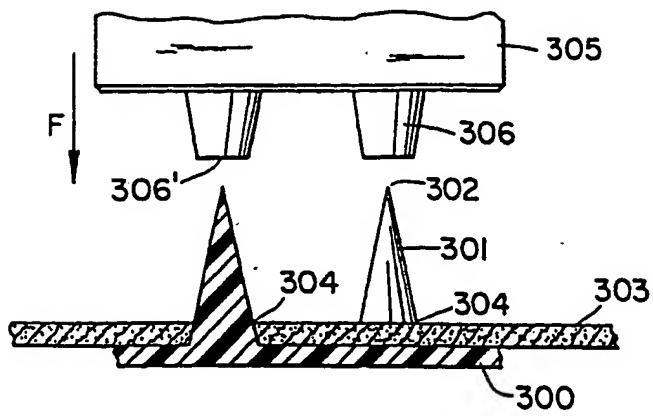


FIG. 11

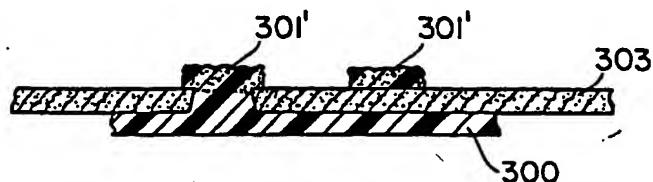


FIG. 12

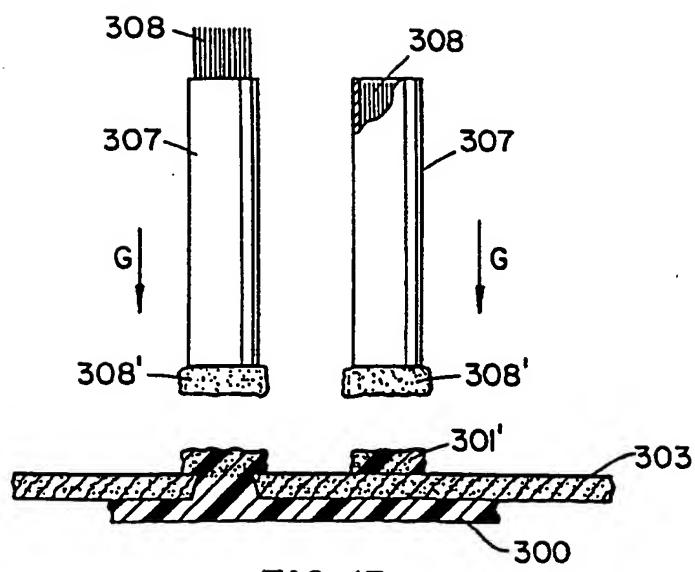


FIG. 13

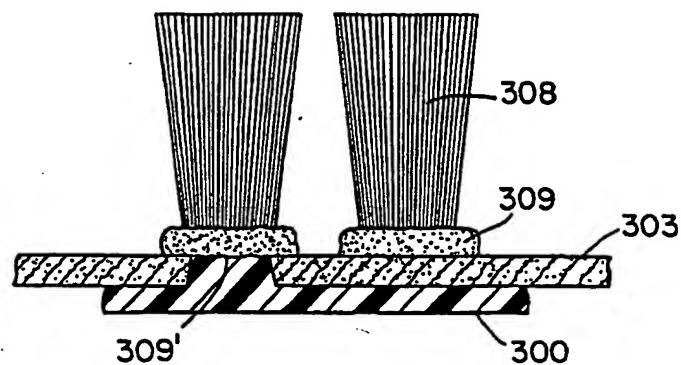


FIG. 14

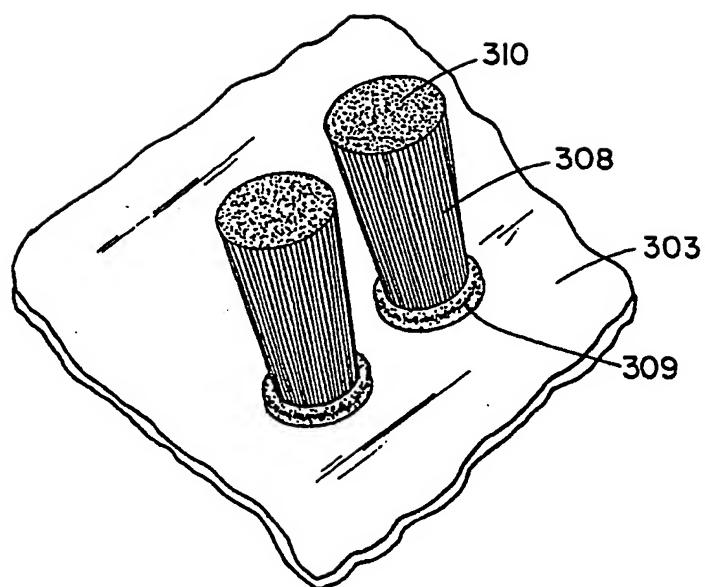


FIG. 15

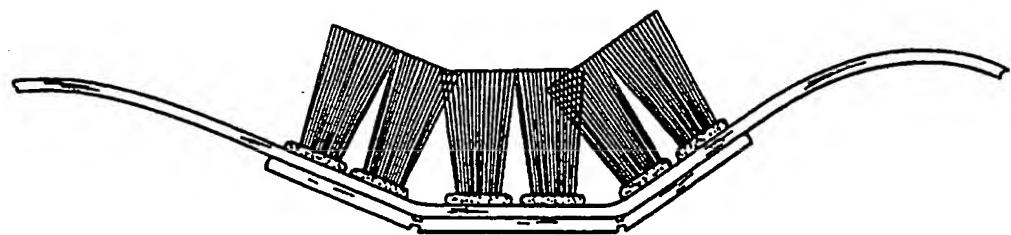


FIG. 16

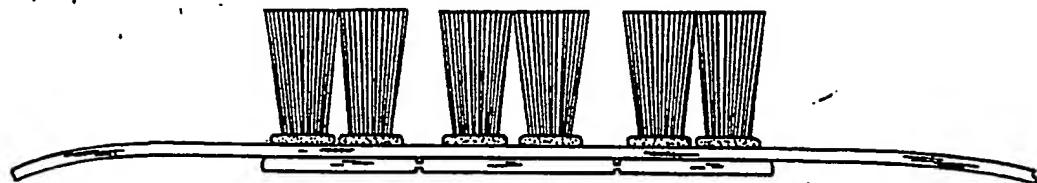


FIG. 17

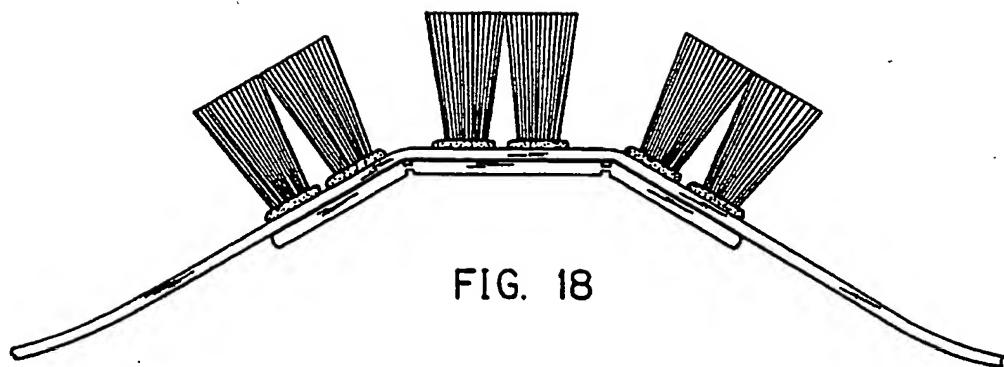


FIG. 18

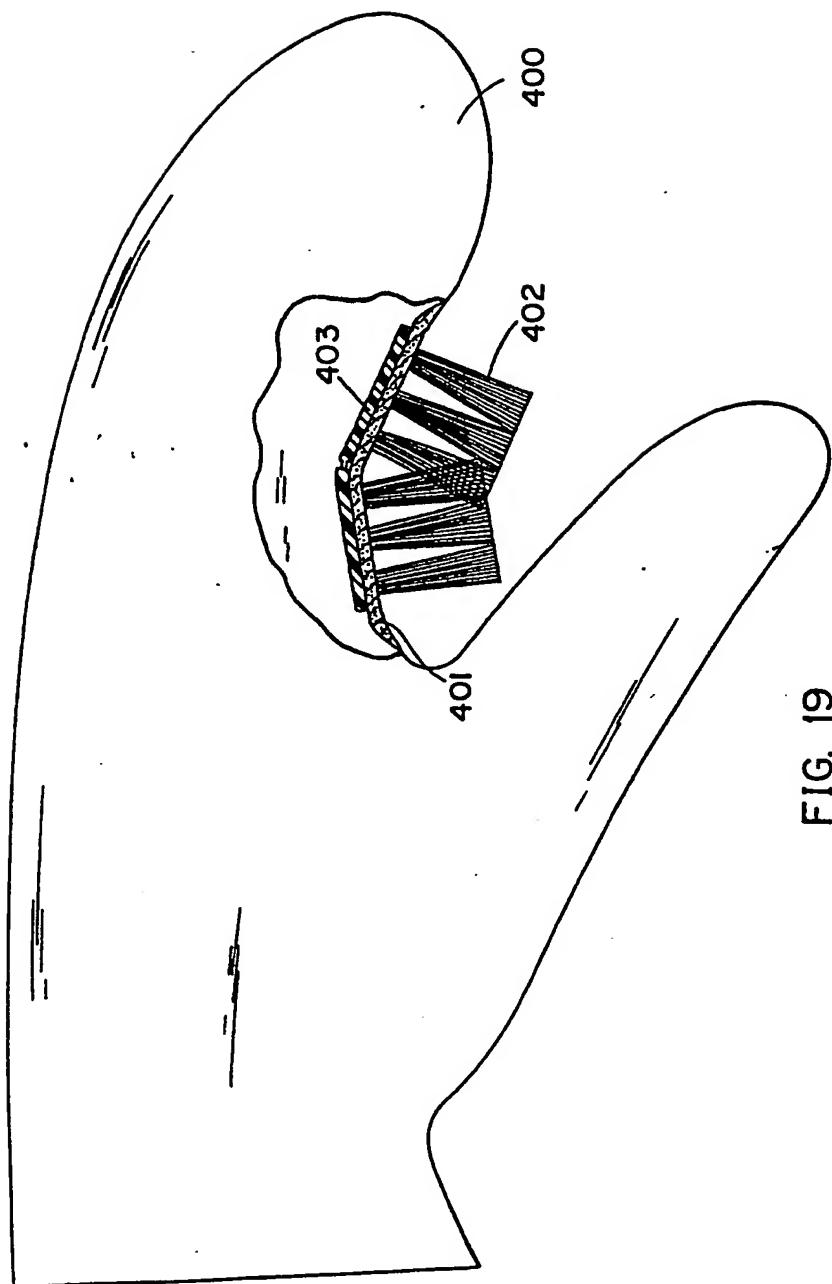


FIG. 19



European Patent  
Office

## EUROPEAN SEARCH REPORT

Application Number

EP 93 30 2426

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int.Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
A	CH-A-412 793 (SCHMIDT) * page 1, line 56 - page 2, line 48; figures *	1, 10	A46B5/06 A46B3/00 A47L23/26
A	FR-A-2 331 302 (H. KRUELL & C.) * figures *	1, 10	
A	GB-A-747 500 (PHILIPSON & CO) * claims; figures *	1, 10	
A, D	US-A-3 799 616 (LEWIS)	1, 10	
A, D	US-A-4 849 271 (WEIHLRAUCH)	1, 10	
A, D	US-A-4 741 941 (ENGLEBERT ET AL.)	1, 10	
A, D	US-A-4 912 800 (ZELTNER)	1, 10	
			TECHNICAL FIELDS SEARCHED (Int.Cl.)
			A46B A47L
<p>The present search report has been drawn up for all claims</p>			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	25 November 1993	Ernst, R	
CATEGORY OF CITED DOCUMENTS		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ..... & : member of the same patent family, corresponding document	
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			